to which I would apply that term, as there are on the neck and wing-coverts of the European bird.

Yarrell's figure gives a very good general idea of the American Bittern, but in two impressions (1st and 2nd editions) examined, the back and wings look rather too dark, and I could hypercr - tically have wished the quills and tail shown of a uniform colour, in which respect they so obviously differ from the same parts in the common species, which are banded. But in figures of so small a size, characters like these can be but partially attended to.

The first *Ardea lentiginosa* which occurred in Europe was (as is well known to ornithologists) described by Montagu under this name; it was killed in Dorsetshire in the autumn of 1804: a second was made known by Dr. E. Moore as shot near Plymouth on the 22nd of Dec. 1829: notice of a third obtained near Christchurch in 1836 was communicated to Mr. Yarrell, who has likewise been told of a bird, believed to be of this species, having been procured in the Isle of Man—but the season or year is not mentioned. About the middle of October 1844, one of these birds—the only one obtained in Scotland—was killed on the property of Sir Wm. Jardine, Bart., in Dumfries-shire, and at a very appropriate time, when Mr. Gould, the well-known ornithologist, was on a visit at Jardine Hall:—where too, I lately had the pleasure of seeing the specimen. These are all the examples known to have occurred in Great Britain. There is no record of this species having been met with on the continent of Europe in Temminck's 'Manuel' &c. (vol. iv. 1840); Keyserling and Blasius' 'Wirbelthiere Europas' (1840), or Schlegel's 'Revue Critique des Oiseaux d'Europe, (1844):—a fact, which, like that of other American species having been obtained in the British Islands, and not farther to the eastward, strengthens the circumstantial evidence in favour of such birds having really crossed the Atlantic. Three out of the four birds of this species, the date of whose occurrence in the British Islands is known to us, were met with about the migratory period when the species leaves the more northern for the southern parts of North America:—the fourth, which was obtained in December, may have arrived at that period, but have remained in the country unobserved until it was killed.

XVI.—*Researches on the Primary Modifications of Organic Matter, and on the Formation of Cells.* By M. Coste*. (2nd Part.)

[Continued from vol. xvi. p. 385.]

The most appropriate examples for supplying the necessary means for resolving the difficult problem of the formation of cells

* Translated from the Comptes Rendus, Dec. 22, 1845.

should be found in those parts where the matter undergoes that primary elaboration which prepares the materials of the new individual. Hence the bases for its solution must be sought in the metamorphoses of the *vitellus*, and we there find the facts developed in so characteristic and evident a manner, that they may be verified by any one. But, before showing how it is that the amorphous matter assumes the cellular form, there is another condition of that matter, the history of which I shall rapidly trace, and with which it is not less important to be acquainted. I allude to that progressive subdivision by means of which it is employed for the production of organic spheres, which must be considered hereafter as special elements of the living tissues. We shall proceed then, first, to study the mode of generation of these spheres in the *vitellus* of Mammalia, subsequently tracing it wherever it occurs. When, in Mammalia, the seminal fluid has passed through the uterus and reached the Fallopian tubes so as to envelope the ovum with its moving molecules, in proportion as the molecules penetrate its substance, we see the yolk undergo the primary modifications which are about to induce the organization of the germ. It commences by becoming concentrated into a smaller volume, and forming itself into a granular globe so perfectly spherical and correctly outlined, that all the grains of which this globe is composed, and which are united together by means of a viscid diaphanous fluid, are apparently retained in the general form which their assemblage represents, by a delicate layer of the same fluid which appears at the periphery as the representative of an enveloping membrane. But if, after having sufficiently guarded against optical illusions, we endeavour to develope the reality of the appearances which obscure it, we soon recognise that such a membrane does not exist, and that those observers, as for instance Barry, who have admitted its existence, have not pursued their examination with sufficient care. Their error here evidently arises from their having considered the superficial part of the viscid matter which retains the granulations mingled in its own substance as an enveloping membrane. This matter is in fact merely lodged in the interstices of the granulations which it agglutinates, and which it separates so regularly that it appears at first sight to form a wall at the periphery of the *vitellus*, the outline of which appears more distinctly delineated in proportion as its transparence contrasts with the opacity of the granulations which it bounds. But, I repeat, this is an illusion which an attentive analysis corrects, and on this point I have sufficiently repeated my observations to have a well-founded conviction.

The *vitellus* is not then, as has been supposed, a vesicle or cell filled with granules, but simply a granular homogeneous sphere,

the whole of the grains of which are kept agglutinated by a diaphanous interstitial matter, the retraction of which matter gives the whole mass the somewhat geometric regularity which it assumes.

Soon (a few hours are sufficient for the accomplishment of this phænomenon) the vitelline sphere divides into two nearly equal parts, each of which, immediately rendered spherical in form by the centripetal retraction of the viscosity which retains its granulations in union, presents the same aspect and the same composition as the whole from which it emanates.

This primary division is scarcely accomplished before the two secondary granular spheres which are thus formed by a primary division of the *vitellus* become in their turn the seat of a similar division, and the same phænomenon being repeated during a certain time upon each new segment, the *vitellus* is finally resolved into a considerable number of granular spheres of a progressively diminishing volume, but always of the same nature. However Reichert, who has made some special researches upon the division of the *vitellus* of the Batrachia, believes he has observed that each segment is a true cell possessing an enveloping membrane and granular contents. According to him, the phænomenon of the division of the yolk would then have a totally different signification to that which we have given, and would essentially be nothing more than an illusion produced by the liberation of the pre-existing vesicles which were inclosed one within another. The *vitellus*, in his view, would at first represent a mother-cell, the wall of which, when ultimately absorbed, would expose to view two inclosed vesicles which form its contents; these two vesicles having thus become free would be dissolved in their turn, and each of them would allow two other vesicles to escape, which would produce an appearance of a division of the yolk into four segments, and so on, until the completion of this illusory division arrived. But although this hypothesis appears to explain a phænomenon until then but little understood, and to corroborate the theory of the exclusive intervention of the cells for the formation of the tissues, it does not follow that we must accept it without examination, and solely from its being reconcilable with an accredited system. I have therefore examined the question with all that care which its importance demands, and, after the most minute researches, I am perfectly convinced that the segments of the *vitellus* or the granular spheres are not real cells. Consequently Barry and Bergmann were deceived when they admitted the contrary.

When the subdivision of the *vitellus* is completed, a process ensues in each of the granular spheres resulting from this division which converts them into true cells. But before arriving at this degree of organization, as we have seen, the living matter

had assumed regular forms, and in each vitelline sphere had acquired a generating activity which becomes a powerful cause of multiplication.

There is then a distinct organic form, which may be considered as a primary act of individualization, or a primary manifestation of life, between the amorphous state of this matter and its actual application to the formation of the cellular walls. This primary act or this primary manifestation has for its object the formation of granular spheres, which, without being bounded by an enveloping membrane, have already a true existence, are true living individuals, inasmuch as they enjoy the faculty of reproduction, and in multiplying they become the active elements of the organism, and contribute to the formation of the tissues of which the organism is composed.

For my own part, I am unacquainted with anything which is more curious to observe than this progressive duplication of living spheres reproducing in each secondary segment the reduced but invariable image of the primary vitelline sphere. And in proportion as we witness the realization of this remarkable phænomenon, we are as it were involuntarily led to seek, in the interior of the substance which is doubled, some material arrangement which may explain a metamorphosis, the cause of which cannot be clearly found elsewhere.

In fact, a more attentive examination soon shows that in the centre of each vitelline sphere there exists a diaphanous homogeneous globule having a fatty aspect, and which cannot be compared to anything better than a drop of oil. Seeing that this globe appears in so constant a manner, we inquire if the division of the *vitellus* cannot be attributed to its influence. But in order to solve this problem, what passes in this same vitellus prior to its division, and when it consequently appears as a simple sphere, should be examined.

We then see that the fatty or oleaginous globe, hidden in the midst of the granulations of the primitive sphere, there undergoes a contraction which divides it into two segments or distinct globules, and each of these segments seems to become a centre, which tends to envelope itself in a portion of the surrounding granulations, separating them from cells which are entangled by its fellow. We should say, in short, that the vitelline sphere, excited simultaneously by two centres of action, yields to each of these centres half the substance of which it is composed, and thus divides into two segments which are immediately rendered spherical; each segment of the vitelline sphere, being furnished with the oleaginous globule which has excited the separation, then becomes in its turn the seat of a similar process, and the division of its central globule induces that of the secondary sphere which contains

it. This is the manner in which the phænomenon of the multiplication of the vitelline spheres ensues; but this phænomenon, which we have considered as the result of a double influence simultaneously exerted upon each of the segments of the *vitellus* by the division of the fatty globe which occupies its centre,—this phænomenon, I say, seems to refer to a still deeper cause, and so to speak, to be nothing more than the external and consecutive repetition of a more intimate and previously completed process. In fact, each central fatty globule contains in its interior a much smaller generating globule, and which appears, in regard to the fatty globule, to play the same part as the fatty globe fulfils with regard to the vitelline spheres by which it is enveloped. So that if we review the whole of the facts which the *vitellus* presents during the transformations which we have described, we find that the elements to which these metamorphoses give rise are derived from one another in a continued series, and are all the result of a triple envelopment.

This envelopment commences by the appearance of a primordial globule within the vitelline spheres; the globule then becomes a centre, around which the fatty globule is condensed; the latter subsequently resolves itself into two distinct fragments; and these fragments, enveloping themselves with the vitelline matter, produce the granular spheres, the mode of multiplication of which I have previously described.

The formation of the organic spheres by successive envelopment around a centre, and their multiplication by subdivision, are such general facts as to require the whole attention of physiologists. They are observed in the *vitellus* of Mammalia, Batrachia, the osseous Fishes, Mollusca, insects and worms. The so frequent production of these particular forms of matter proves, in opposition to the opinion of Schleiden and Schwann, that organized bodies are not exclusively composed of cells; but that other elements may also enter into the composition of their tissues, and that the organic spheres ought to be reckoned among these elements. They do not in fact appear only as a transitory modification of the vitelline matter undergoing the primary influences of fecundation, for they are also found in tissues which are undergoing development, and even in those which form a part of the adult organism. It is these which, by their juxtaposition in the Mammalia, give origin to the earliest and most important formation of the tissues of the germ, because the blastodermic membrane is formed at their expense; that is to say, that which will subsequently become the basis of the entire organism. It is true that by gradual conversion into cells they soon raise the blastodermic membrane to a higher degree of organization; but they reproduce it at a period when they are still simple granular spheres, and

they then still enjoy all the properties of these spheres, so that after their incorporation they continue for a certain time to multiply by subdivision, as we shall show in a future memoir.

XVII.—*Notes on* Phrynosoma Harlani, *Wieg.*

By Dr. Patrick Neill.

Dear Sir,

In the autumn of 1844 I was presented with a beautiful specimen of the *Phrynosoma Harlani* by a gentleman who had brought it direct from Texas. After keeping it a week or two the creature was sent to my friend Dr. Neill, and the inclosed letters relating to its habits appear to me of sufficient interest to warrant their publication.

I am, dear Sir, yours very truly,

Richard Taylor, Esq. George Johnston.

My dear Sir, Canonmills, Dec. 28, 1844.

The curious Texas Lizard, after six weeks' residence in my hothouse, is still alive, and taking a fly when we can tempt him with a living one.

On procuring Dumeril and Bibron from my friend Mr. Wilson, I found a full and accurate description of the animal, *Phrynosoma Harlani* of Wiegmann, *Agama cornuta* of Harlan, and apparently *Lacerta orbicularis* of Linnæus. The coloured figure in Griffith's 'Règne Animal' seems to have been taken from a museum specimen, for the bright colours are deficient: what is pale brown in Griffith's figure, is in the living subject, when lively and in a temperature of 65° or 70° F., golden yellow. The *description* of the colours is, to some extent, liable to the same exception.

Fortunately flies are found in our steam-engine room all the winter, and I carry home two or three in a small box every Saturday. *Phrynosoma* is rather cunning or suspicious; for we have been unable to see him catch at a fly, so as to know whether he throws out the tongue as the chameleon used to do. The gardener has watched ten minutes in vain; yet if he leaves a disabled fly with him for five minutes, the fly has disappeared on his return. He can climb the perpendicular smooth wooden wall of a box in which we keep him and can adhere to the wall. He can leap somewhat like a frog, or rather like a toad—clumsily and to a small distance only—not twice the length of his own body. Miss Neill thinks she heard him utter a kind of squeaking croak, but neither the gar-